What is claimed is:

1. An image forming apparatus comprising:

an image carrier configured to carry a latent image thereon;

two developing devices facing said image carrier and each configured to develop a particular latent image formed on said image carrier with a respective developer carrier, said two developing devices being constructed into a single developing unit; and

rotating means for causing said developing unit to angularly move about a preselected axis;

wherein said rotating means selectively moves said developing unit to one of

a position where one of said two developing devices is located at a developing position close to said image carrier while the other developing device is located at a non-developing position spaced from said image carrier,

a position where said the one developing device is located at a non-developing position spaced from said image carrier while the other developing device is located at a developing position close to said image carrier, and

a position where said two developing devices both are located at the non-developing positions.

2. The apparatus as claimed in claim 1, wherein the axis of said developing unit extends through or around a

center of gravity of said developing unit.

3. The apparatus as claimed in claim 1, further comprising drive means for applying a drive force necessary for development only to structural elements of the developing device located at the developing position;

wherein the developing device to which the drive force is to be applied is switched at the same time as an angular movement of said developing unit such that said drive means drives the structural elements of the developing device located at the developing position, but does not drive structural elements of the developing device located at the non-developing position,

a driven member of the developing device to which the drive force is applied and a drive member of said driving means comprise a driven gear and a drive gear, respectively,

axes of driven gears, each belonging to a respective developing device, and an axis of the drive gear are parallel to the axis of said developing unit, and

an angle of rotation θg of the developing devices about the axis of said developing unit satisfies a following condition:

when $S1 < s2$

$$\theta g \geq \cos^{-1}[\{sl^2 + l^2 - (a + 2 \cdot m)^2\}/(2 \cdot sl \cdot l)] - \cos^{-1}\{(sl^2 + l^2 - a^2)/(2 \cdot s1 \cdot 1)\}$$

where *l* denotes a distance between the axis of said developing unit and the axis of the drive gear, s1 denotes a distance between the axis of one of the driven gears and said axis of said developing unit, s2 denotes a distance between the axis of the other driven gear and said axis of said developing unit, *a* denotes a distance between the axis of the driven gear of the developing device applied with the drive force and said axis of said drive gear, and *m* denotes a module of a gear member.

4. The apparatus as claimed in claim 3, wherein said drive means is controlled such that when said rotating means is moving said developing unit, said drive gear continuously rotates.

5. The apparatus as claimed in claim 4, wherein the axis of said developing unit extends through or around a center of gravity of said developing unit.

6. The apparatus as claimed in claim 1, wherein said image carrier comprises a cylindrical member rotatable about an axis of said image carrier,

said developer carriers of said developing devices comprise roller members rotatable about axes of said

developing devices,

the axis of said developer carriers and the axis of said image carrier are parallel to the axis of said developing unit, and

an angle of rotation θr of said developing unit caused by said rotating means satisfies a following condition:

$$\theta r \geq [\cos^{-1}\{(r1^2 + L^2 - Aoff^2)/(2 \cdot r1 \cdot L)\} - \cos^{-1}\{(r1^2 + L^2 - Aon^2)/(2 \cdot r1 \cdot L)\}] + [\cos^{-1}\{(r2^2 + L^2 - Aoff^2)/(2 \cdot r2 \cdot L)\} - \cos^{-1}\{(r2^2 + L^2 - Aon^2)/(2 \cdot r2 \cdot L)\}]$$

where L denotes a distance between the axis of said developing unit, r1 denotes a distance between an axis of one of said developer carriers and said axis of said developing unit, r2 denotes an axis of the other developer carrier and said axis of said developing unit, Aon denotes a distance between an axis of said image carrier and an axis of the image carrier necessary when the developing device is located in the developing position, and Aoff denotes a distance between said axis of said image carrier and said axis of said developer carrier necessary when said developing device is located at the non-developing position.

7. The apparatus as claimed in claim 6, further comprising drive means for applying a drive force necessary for development only to structural elements of the developing device located at the developing position;

wherein the developing device to which the drive force is to be applied is switched at the same time as an angular movement of said developing unit such that said drive means drives the structural elements of the developing device located at the developing position, but does not drive structural elements of the developing device located at the non-developing position,

a driven member of the developing device to which the drive force is applied and a drive member of said driving means comprise a driven gear and a drive gear, respectively,

axes of driven gears, each belonging to a respective developing device, and an axis of the drive gear are parallel to the axis of said developing unit, and

an angle of rotation θg of the developing devices about the axis of said developing unit satisfies a following condition:

when $S1 < s2$

$$\theta g \geq \cos^{-1}[\{sl^2 + l^2 - (a + 2 \cdot m)^2\}/(2 \cdot sl \cdot l)] - \cos^{-1}\{(sl^2 + l^2 - a^2)/(2 \cdot sl \cdot l)\}$$

where *l* denotes a distance between the axis of said developing unit and the axis of the drive gear, s1 denotes a distance between the axis of one of the driven gears and said axis of said developing unit, s2 denotes a distance between the axis of the other driven gear and said axis of said developing unit, *a* denotes a distance between the axis of the driven gear of the developing device applied with the drive force and said axis of said drive gear, and *m* denotes a module of a gear member.

8. The apparatus as claimed in claim 7, wherein said drive means is controlled such that when said rotating means is moving said developing unit, said drive gear continuously rotates.

9. The apparatus as claimed in claim 8, wherein the axis of said developing unit extends through or around a center of gravity of said developing unit.

10. An image forming apparatus comprising:

an image carrier; and

at least one image forming unit comprising two developing means positioned side by side around said image carrier while facing said image carrier each for developing a particular latent image formed on said image carrier with a developer of a particular color;

wherein said image forming unit sequentially

develops latent images sequentially formed on said image carrier in two colors by switching said two developing means to thereby produce corresponding toner images, said toner images being sequentially transferred to an intermediate image transfer body one above the other and then transferred to a recording medium,

said two developing means are constructed into a single developing unit and rotatable about respective axes parallel to an axis of said image carrier,

said image forming unit supports said developing unit such that said developing unit is angularly movable about an axis substantially parallel to the axis of said image carrier and comprises switching means for angularly moving said developing unit by a preselected angle relative to said image forming unit to thereby condition a gap between one of said two developing means and said image carrier for development,

said switching means comprises drive means for driving said developing unit in a direction of angular movement and limiting means for limiting an angular movement of said developing unit, and

said limiting means is positioned around opposite ends of said developing unit in a direction of the axis of said developing unit.

11. The apparatus as claimed in claim 10, wherein

the axis of said developing unit extends through a position around a center of gravity of said developing unit.

12. The apparatus as claimed in claim 11, wherein said limiting means comprises a roller member freely rotatable about the axis of said developing means and contacting said image carrier at an outer periphery of said roller member.

13. The apparatus as claimed in claim 11, wherein said limiting means comprises a roller member freely rotatable about the axis of said image carrier and contacting said developing means at an outer periphery of said roller member.

14. The apparatus as claimed in claim 11, wherein said limiting means comprises an adjusting mechanism configured to adjust a position where the angular movement of said developing unit should be limited.

15. The apparatus as claimed in claim 11, wherein said switching means comprises eccentric cams adjoining opposite ends of said developing unit in a direction of the axis and rotatable about respective axes parallel to said axis of said developing unit, and cam contact surfaces formed integrally with said developing unit in opposite end portions of said developing unit, and

said eccentric cams bias, when rotated, said cam contact surfaces to thereby move said developing unit in

the direction of angular movement, the angular movement of said developing unit being limited when said eccentric cams stop rotating.

16. The apparatus as claimed in claim 15, wherein said cam contact surfaces comprise roller members freely rotatable about the axes of respective developing means and contacting said eccentric cams at outer peripheries thereof.

17. The apparatus as claimed in claim 16, wherein said eccentric cams each are formed with a guide groove in which one of said roller members is received.

18. The apparatus as claimed in claim 16, wherein said eccentric cams each comprise a cam surface contacting roller members freely rotatably mounted on the one developing means or the other developing means.

19. The apparatus as claimed in claim 15, wherein said eccentric cams are supported to be freely rotatable about the axis of said image carrier.

20. The apparatus as claimed in claim 15, further comprising an adjusting mechanism for adjusting, at a rotation stop position where one of said eccentric cams positioned at one end side contacts one of said cam contact surfaces positioned at said one end side to thereby limit the angular movement of said developing unit, a contact condition of the other eccentric cam positioned at the

other end side with the other cam contact surface positioned at said other end side.

21. The apparatus as claimed in claim 15, further comprising an adjusting mechanism for adjusting, at a rotation stop position where one of said eccentric cams positioned at one end side contacts one of said cam contact surfaces positioned at said one end side to thereby limit the angular movement of said developing unit, a contact condition of the other cam contact surface positioned at the other end side with the other eccentric cam positioned at said other end side.

22. The apparatus as claimed in claim 15, wherein said cam contact surfaces each comprise two cam contact surfaces nipping a cam surface of one of said eccentric cams.

23. The apparatus as claimed in claim 15, further comprising an adjusting mechanism for adjusting an amount and a phase of eccentricity of one of said eccentric cams relative to the axis of the one eccentric cam.

24. The apparatus as claimed in claim 15, further comprising an eccentricity adjusting mechanism for adjusting an amount of eccentricity of one of said eccentric cams relative to the axis of the one eccentric cam, and a phase adjusting mechanism for adjusting a phase of eccentricity of the other eccentric cam relative to the

axis of said other eccentric cam.

25. The apparatus as claimed in claim 15, wherein said switching means comprises a stepping motor for causing said eccentric cams to rotate, and

when said developing means are switched, a number of steps of the stepping motor is set to thereby limit the angular movement of said developing unit.

26. The apparatus as claimed in claim 25, further comprising sensing means for sensing, when said developing means are switched, an angular position of said developing unit that constitutes a reference for an operation of said developing means, wherein the number of steps of the stepping motor is set in accordance with said angular position sensed by said sensing means.

27. The apparatus as claimed in claim 25, further comprising process sensing means for sensing process conditions for image formation including a toner content of a developer, a charge potential and an exposure potential, wherein the number of steps of the stepping motor is set in accordance with an output of said sensing means.

28. The apparatus as claimed in claim 25, further comprising sensing means for sensing environmental conditions including temperature and humidity, wherein the number of steps of the stepping motor is set in

accordance with an output of said sensing means.

29. The apparatus as claimed in claim 25, further comprising mode setting means for setting an image forming mode, which may be any one of a color mode, a black-and-white mode and a photo mode, wherein the number of steps of the stepping motor is set in accordance with said image forming mode set.

30. The apparatus as claimed in claim 10, wherein said limiting means comprises a roller member supported to be freely rotatable about the axis of individual developing means and contacting said image carrier at an outer periphery thereof.

31. The apparatus as claimed in claim 10, wherein said limiting means comprises a roller member supported to be freely rotatable about the axis of said image carrier and contacting individual developing means at an outer periphery thereof.

32. The apparatus as claimed in claim 10, wherein said limiting means comprises an adjusting mechanism for adjusting a position where an angular movement of said developing unit should be limited.

33. The apparatus as claimed in claim 10, wherein said switching means comprises eccentric cams adjoining opposite ends of said developing unit in a direction of the axis and rotatable about respective axes parallel to

said axis of said developing unit, and cam contact surfaces formed integrally with said developing unit in opposite end portions of said developing unit, and

said eccentric cams bias, when rotated, said cam contact surfaces to thereby move said developing unit in the direction of angular movement, the angular movement of said developing unit being limited when said eccentric cams stop rotating.

34. The apparatus as claimed in claim 33, wherein said cam contact surfaces comprise roller members freely rotatable about the axes of respective developing means and contacting said eccentric cams at outer peripheries thereof.

35. The apparatus as claimed in claim 34, wherein said eccentric cams each are formed with a guide groove in which one of said roller members is received.

36. The apparatus as claimed in claim 34, wherein said eccentric cams each comprise a cam surface contacting roller members freely rotatably mounted on the one developing means or the other developing means.

37. The apparatus as claimed in claim 33, wherein said eccentric cams are supported to be freely rotatable about the axis of said image carrier.

38. The apparatus as claimed in claim 33, further comprising an adjusting mechanism for adjusting, at a

rotation stop position where one of said eccentric cams positioned at one end side contacts one of said cam contact surfaces positioned at said one end side to thereby limit the angular movement of said developing unit, a contact condition of the other eccentric cam positioned at the other end side with the other cam contact surface positioned at said other end side.

39. The apparatus as claimed in claim 33, further comprising an adjusting mechanism for adjusting, at a rotation stop position where one of said eccentric cams positioned at one end side contacts one of said cam contact surfaces positioned at said one end side to thereby limit the angular movement of said developing unit, a contact condition of the other cam contact surface positioned at the other end side with the other eccentric cam positioned at said other end side.

40. The apparatus as claimed in claim 33, wherein said cam contact surfaces each comprise two cam contact surfaces nipping a cam surface of one of said eccentric cams.

41. The apparatus as claimed in claim 33, further comprising an adjusting mechanism for adjusting an amount and a phase of eccentricity of one of said eccentric cams relative to the axis of the one eccentric cam.

42. The apparatus as claimed in claim 33, further

comprising an eccentricity adjusting mechanism for adjusting an amount of eccentricity of one of said eccentric cams relative to the axis of the one eccentric cam, and a phase adjusting mechanism for adjusting a phase of eccentricity of the other eccentric cam relative to the axis of said other eccentric cam.

43. The apparatus as claimed in claim 33, wherein said switching means comprises a stepping motor for causing said eccentric cams to rotate, and

when said developing means are switched, a number of steps of the stepping motor is set to thereby limit the angular movement of said developing unit.

44. The apparatus as claimed in claim 43, further comprising sensing means for sensing, when said developing means are switched, an angular position of said developing unit that constitutes a reference for an operation of said developing means, wherein the number of steps of the stepping motor is set in accordance with said angular position sensed by said sensing means.

45. The apparatus as claimed in claim 43, further comprising process sensing means for sensing process conditions for image formation including a toner content of a developer, a charge potential and an exposure potential, wherein the number of steps of the stepping motor is set in accordance with an output of said sensing

means.

46. The apparatus as claimed in claim 43, further comprising sensing means for sensing environmental conditions including temperature and humidity, wherein the number of steps of the stepping motor is set in accordance with an output of said sensing means.

47. The apparatus as claimed in claim 43, further comprising mode setting means for setting an image forming mode, which may be any one of a color mode, a black-and-white mode and a photo mode, wherein the number of steps of the stepping motor is set in accordance with said image forming mode set.

48. The apparatus as claimed in claim 10, further comprising distance sensing means for sensing distances between the axes of said developing means and the axis of said image carrier, wherein an angular position of said developing unit is determined in accordance with outputs of said distance sensing means.

49. The apparatus as claimed in claim 48, wherein said distance sensing means senses a distance between a surface of each developing means and a surface of said image carrier.

50. The apparatus as claimed in claim 48, wherein said distance sensing means comprises two sensing means responsive to distances between the axes of said

developing means and the axis of said image carrier and positioned in the vicinity of opposite ends of said developing unit in an axial direction.

51. The apparatus as claimed in claim 50, further comprising process sensing means for sensing process conditions for image formation including a toner content of a developer, a charge potential and an exposure potential, wherein a target value of an output signal of said distance sensing means is determined in accordance with said process conditions sensed by said process sensing means.

52. The apparatus as claimed in claim 50, further comprising environmental condition sensing means for sensing environmental conditions including temperature and humidity, wherein a target value of an output signal of said distance sensing means is determined in accordance with said environmental conditions sensed by said environmental condition sensing means.

53. The apparatus as claimed in claim 50, further comprising for setting an image forming mode, which may be any one of a color mode, a black-and-white mode and a photo mode, wherein a target value of an output signal of said distance sensing means is determined in accordance with the image forming mode set by said mode setting means.

54. The apparatus as claimed in claim 48, further

comprising process sensing means for sensing process conditions for image formation including a toner content of a developer, a charge potential and an exposure potential, wherein a target value of an output signal of said distance sensing means is determined in accordance with said process conditions sensed by said process sensing means.

55. The apparatus as claimed in claim 48, further comprising environmental condition sensing means for sensing environmental conditions including temperature and humidity, wherein a target value of an output signal of said distance sensing means is determined in accordance with said environmental conditions sensed by said environmental condition sensing means.

56. The apparatus as claimed in claim 48, further comprising for setting an image forming mode, which may be any one of a color mode, a black-and-white mode and a photo mode, wherein a target value of an output signal of said distance sensing means is determined in accordance with the image forming mode set by said mode setting means.

57. The apparatus as claimed in claim 10, wherein said drive means is positioned in the vicinity of opposite ends of said developing unit in an axial direction and determines a position wherein an angular movement of said developing unit should be limited.

58. The apparatus as claimed in claim 57, wherein said distance sensing means is positioned in the vicinity of the opposite ends of said developing unit,

the position where the angular movement of said developing unit should be limited by the drive means positioned at one end side is controlled in accordance with an output of the distance sensing means positioned at said one end side, and

the position where the angular movement of said developing unit should be limited by the drive means positioned at the other end side is controlled in accordance with an output of the distance sensing means positioned at said other end side.

59. The apparatus as claimed in claim 58, wherein said distance sensing means each sense a distance between a surface of said developing means and a surface of said image carrier.

60. The apparatus as claimed in claim 59, wherein said eccentric cams are supported to be freely rotatable about the axis of said image carrier.

61. The apparatus as claimed in claim 59, further comprising process sensing means for sensing process conditions for image formation including a toner content of a developer, a charge potential and an exposure potential, wherein a target value of an output signal of

said distance sensing means is determined in accordance with said process conditions sensed by said process sensing means.

62. The apparatus as claimed in claim 59, further comprising environmental condition sensing means for sensing environmental conditions including temperature and humidity, wherein a target value of an output signal of said distance sensing means is determined in accordance with said environmental conditions sensed by said environmental condition sensing means.

63. The apparatus as claimed in claim 59, further comprising for setting an image forming mode, which may be any one of a color mode, a black-and-white mode and a photo mode, wherein a target value of an output signal of said distance sensing means is determined in accordance with the image forming mode set by said mode setting means.

64. The apparatus as claimed in claim 58, further comprising process sensing means for sensing process conditions for image formation including a toner content of a developer, a charge potential and an exposure potential, wherein a target value of an output signal of said distance sensing means is determined in accordance with said process conditions sensed by said process sensing means.

65. The apparatus as claimed in claim 58, further

comprising environmental condition sensing means for sensing environmental conditions including temperature and humidity, wherein a target value of an output signal of said distance sensing means is determined in accordance with said environmental conditions sensed by said environmental condition sensing means.

66. The apparatus as claimed in claim 58, further comprising for setting an image forming mode, which may be any one of a color mode, a black-and-white mode and a photo mode, wherein a target value of an output signal of said distance sensing means is determined in accordance with the image forming mode set by said mode setting means.